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The Province of Alberta

PETROLEUM AND NATURAL GAS CONSERVATION BOARD

Application for Permission to Remove or cause to be removed Natural Gas from the Province of Alberta, under the Provisions of the Gas Resources Preservation Act by Northwest Natural Gas Company and Alberta Natural Gas Grid, Ltd.

I. N. McKinnon Esq., Chairman

D. P. Goodall Esq.

Dr. G. W. Govier

Session: June 9th, 1950.

Volume 11.

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June 9th, 1950.

MR. NOLAN: Mr. Chairman and Gentlemen: I propose now, with your permission, to call Mr. Dixon.

A. FAISON DIXON, recalled, already sworn, examined by Mr. Nolan, testified as follows:

Q Well, Mr. Dixon, perhaps you will tell me your name and where you reside?

A My name is A. Faison Dixon, and I reside in Pelham, New York.

Q And you are the President of the Northwest Natural Gas Company?

A Yes, sir.

Q And will you be good enough to tell me briefly something of your academic qualifications and your professional experience?

A I graduated from Harvard College, specializing in geology, in 1907, and graduated from the Graduates' School of Applied Science with the degree of Mining Engineer in 1909. I then did a little work as Field Geologist in Michigan, and then went to India, Burma and Assam. I worked around there doing geological work, and a little oil work, for about 3 years. I then returned to the United States and went to work for a company that did become the Caribbean Petroleum Company, doing geological work in Venezuela. I worked there as a geologist for a time and then became Field Manager in charge of the work of the Colon Development Company. This is the company that had assets in Venezuela, where Mr. Swinerton told about building the line across the mountains. I explored the mountains where that line was to be built, or was eventually built, about the year 1913. I worked there for these people and the Shell interests until I returned

to the United States during the first World War. I then worked for the United States government, first on strategic material and minerals, then at making estimates of oil and gas reserves for the government until the end of the war.

I then did a little work for various people until we formed the firm of Brokaw, Dixon & McKee. From then for about 10 years I did general geological work, chiefly in oil, and my work took me to France, Spain, Morocco, Trinidad, Venezuela, Colombia, Guatemala, Mexico, Haiti, Santo Domingo, Honduras, Canada and most of the oil fields of the United States.

About 1926 or '27, I got to do more gas work, estimating gas reserves. The first work I did was helping my partner, Dr. Brokaw, in making estimates of the Monroe field. I then did a little work for Mr. Upham, who was building or planning a line from the Panhandle field of Texas to Wichita. I tested the wells there. This was before there was, before the Panhandle field was really sufficiently developed, that is, in the Eastern part, to know whether there was a large gas field there or not. This line was afterwards built and is now a part of the United Gas System.

I then worked for Moody-Seagraves, a group of enterprisers who put together several gas companies, one of which, the Dixie Gulf Gas Company, was a line from near Shreveport to Beaumont. With regard to this line, I estimated the reserves for them in the different gas fields and worked up the deliverability when the word "deliverability" had not then been invented, and was in charge of the construction of that line. During this time I became interested

with a Mr. Paul Kaiser in the development of the gas line from the Permian basin to El Paso. I did intermittent work for him until the El Paso company was formed. The line was built and I was in charge of the installation of that line. It was just a line from Lee County, New Mexico, into El Paso itself.

I then did some work for the Southern Natural Gas Company. We estimated the gas reserves.

I worked for the Missouri-Kansas Pipeline Company before the Panhandle Company, which is a subsidiary of theirs, and with my partners we helped to select leases, and I laid out the line, did all of the fuel surveys in several States, all the way from Kansas City to Detroit. And at one time we were thinking of going up to Minneapolis and St. Paul. We surveyed most of the fuel market getween Kansas City and St. Paul. We were in charge of the installation and construction of that line. Afterwards it had a long checkered history. It became or was under the control for a time of the Columbia Gas System, and then the Missouri-Kansas, which I had been Vice-President of for some time, got control of it, and I was the director for quite a time of the Panhandle Company, and did a great deal of work for them on gas reserves.

I was in at the start of the Tennessee Gas Transmission Company when that line was first conceived. We had many hearings over a long period of time, which was about 4 years of hearings, before we could get permission to build that line. I did a great deal of work on that line, the laying out of a projected line, and fuel

surveys, and when the line was constructed I was consulting engineer for the company during the period of construction.

Now, the United Gas Company, we were in on that at the time it was formed by joining together a great many other companies, in which we made an estimate of the entire gas reserves of the enterprise, and then I was consulting geologist for them for a period of 3 years. Now, these companies had started from scratch, the United Gas Company, the El Paso Natural Gas Company, the Panhandle Company and the Tennessee Company. They have now a production of about 2 billion cubic feet per year.

Q Per day?

A Per day, pardon me. I have been more closely connected with the El Paso than any of the other enterprises. Just 3 weeks ago I was testifying before the Federal Power Commission in regard to their reserves and deliverability. They are bringing the line up to now, to something more than 1 billion a day.

I think that is all in regard to my qualifications.

Q Well, we would be interested, Mr. Dixon, in having you tell something of the conception of this project in which we are now interested?

A This enterprise started by a group of us thinking where to start another enterprise and looking at a map, the Pacific Northwest looked like the most favorable territory to bring gas to, on account of the fact there was no gas there. I then came to Washington and made a quick study of the market up and down the coast. Shortly after that, I drove from the

Hugoton field all the way across to see if a line could be built from the Hugoton field to the Pacific Northwest. Well, it seemed a very long ways and we examined into the possibilities of Wyoming and Montana. I visited the regional Church Buttes where there was great development going on, and finally, at the suggestion of the Standard Oil of California, who said they had a great deal of gas land up here, I came to Alberta. We had Alberta in mind all the time, but we did not think up to that time there was enough development here to warrant studying it to bring a line to the Pacific Northwest. I then came here in 1947 and started our studies, which I have told about in my former testimony here.

Q Mr. Dixon, your function this morning,as I understand it, is to discuss before the Board the design of these two lines, Route A and Route B. That is right, isn't it?

A Yes. I have here two designs.

Q And I think I will have them marked, Mr. Chairman, before we go very far with them. If they could be given a number, sir. The proposed Route A - -

A Route B I would rather take up first.

Q Route B first?

A Yes.

MR. NOLAN: There are two sheets, sir. The smaller sheet comes first, if that would be given a number?

THE CHAIRMAN: Exhibit 28.

DESIGN OF ROUTE B MARKED
EXHIBIT 28.

MR. NOLAN: And we will just mark the other

one as well, please, the longer one. This will be Route B, Exhibit 29?

THE CHAIRMAN: Exhibit 29.

MR. NOLAN: Exhibits 28 and 29.

THE CHAIRMAN: Yes.

DESIGN OF ROUTE B MARKED
EXHIBIT 29.

Q MR. NOLAN: I wanted to ask you one or two questions, Mr. Dixon, before you proceed to go on into detail about this. What is the design of the line?

A The design of a line is the plan or scheme to bring the gas from the field to the market. It should show the pressures on the line, the length of the line, where the gas is going to be taken in, the amounts of gas that are going to be taken in, the points of sale, the amounts of sale, the pressures on the line, the compression ratio, and the horsepower required for the compression period.

Q And how is it made? Is it built up on some sort of a formula?

A The flow of gas through the line is based on a formula. I used the Panhandle formula, that is one in which the original experimental data I had something to do with, and it has the great advantage of being almost universally used, and you can take a slide rule, so that we make our calculations on that formula, and it can be done very quickly by the slide rule. You do not have to be going back to the formula.

(Go to page 886.)

Now in any formula such as this, if we know one factor in the formula we can be accurate. That is the coefficiency of efficiency.

Q The coefficient of efficiency?

A The coefficient of efficiency. In the case of the Tennessee line on one load of pipe it was shown that the Panhandle formula, and we figured at the end of the line that we would be able to deliver 207 million cubic feet a day. We took a coefficient of 10%. After a few days of working we noticed that we delivered 218 million, so that the coefficient was a little bit too low. In another case in the Panhandle line itself, and using this Panhandle formula, it was built in the series of lines from one point to another and tests were made at a number of sub-stations and they gave different results. In one place the delivery was so much and in the next the deliverability was much lower. We could not figure it out. We tested it and came to the conclusion that when the original tests were made, the hot gas going through the line must have caused corrosion. So that there are different frictional factors.

Now that can be taken care of by putting in more compressor stations.

Q Now will you tell us something about the supplies for the City of Calgary, to start with?

A In this design of the grid system we have assumed the fields as being the ones existing as far as we know as of the present moment, that is after the 5th year of operation, irrespective of those that very naturally we hope will be produced in the future. Things have changed to a considerable

extent since I have done this, which was done at the very last moment because I was expecting to get some other changes in it. It is fluctuating and assuming that any large field should be discovered it may be necessary to change the design of the line. But as it is, this only deals with existing fields. I started out to prove to myself that there was sufficient gas to supply the cities of Calgary and Edmonton and the Province of Alberta generally and then have some gas for export.

Q And a supply for the City of Vancouver?

A Of course.

Q Generally speaking, that is the scheme of the design?

A Yes.

Q I wanted to ask you why haven't you got a written script accompanying the chart?

A Because this is the customary way of putting in the design of a line. When we submit flow sheets such as this in submitting the design, there is no other explanation needed, everything is on this sheet.

Q And so you say there is no reason for giving anything else?

A That is correct.

Q Now would you take Exhibit 28 and take it up at Legal, the top and then go along and explain it as you go along down on that exhibit?

A Starting away up at Legal, I may say that this is a maximum load. If you have the line built for a maximum load, any smaller loads will take care of themselves. So this is the load for a peak day. Assuming that we are taking out of Pincher Creek - let us see the exact amount - 30936 Mcf per

day, that is, we might take out that amount but that is greatly in excess of what we anticipate taking out, but this is designed for that amount. In starting in at Legal we have planned to take 25 million from the Legal. Legal is the most difficult region we have in which to try to determine the deliverability of the wells as we have loose figures on that, odd figures like 25 to 100, are in odd amounts in order to take care of the losses so that we can come out with these amounts. They are scattered, as Mr. Slipper,has described. There are about 240 billion, according to his estimate, in that region, Legal and Morinville. If we take 24 billion and considering the reserves at 24 billion, 25 million a day would give us about 25 years' supply. This is a dry reservoir and we always think of the dry gas fields as the ones that will take the peak loads and the distillate fields or the oil fields will take the base loads. So assuming our load factor at 50%, that amount would give you a supply for 50 years. It has the disadvantage, from my point of view, of trying to calculate, due to the fact that most of the wells, the information we have on the wells there is due to drill stem tests. That shows that gas is there but makes it very difficult to tell the exact amount. Then we come to Leduc and from there they are now producing, I understand, in the neighborhood of 10 or 12 million a day. There is a contract, I understand, that is being negotiated under which the Edmonton Gas Company will take that supply of gas from the Leduc gasoline plant up to 10 or 12 million per day. Now in Leduc we have gas in solution in the D-2. As I remember, it is 98 billion, and with the addition of

of the estimate of the amount of gas in the D-3 there are 242 billion of gas in solution. About one-half a trillion of gas in the gas cap. Now in the case of gas in solution as the amount of oil comes out and the pressure drops, assuming continuous production at the same amount, the gas-oil ratio rises and the amount of gas coming from the field increases. In relation to my work with El Paso, I have done a great deal of work on that. Now it can be calculated just how much the gas-oil ratio will be, but calculations do not always come out just right. It seems to be for the first few years the gas-oil ratio rises very rapidly above what the formula would indicate and then slowly goes down. If there is an efficient effective water drive there would be no change in the gas-oil ratio. That would be the ideal condition. My work on this shows that operators generally are over-optimistic. They of course think that it is not going to increase as much as it eventually does. When it comes to the gas cap, that is a different story if the oil below the gas cap is taken out very carefully and the wells are drilled correctly, because a gas well with a high gas-oil ratio is shut off, they plug it back and cut off the gas, and the gas cap can be preserved indefinitely. That is, of course, what we all hope will happen in the case of Leduc. If that does happen, and it can happen with proper regulation, we would have 700 billion available to Edmonton from the Kinsella-Viking plus this gas cap which will not come into effective use as a gas source for some 20 years. That would give 1 trillion 232 billion cubic feet available for Edmonton. Now that, combined with all the other possibilities of gas

in this neighbourhood, in Redwater and Golden Spike, indicates that Edmonton has a gas supply that is so much more than - there is no other place in the world that I know of which can compare with it. It already has got enough natural gas to last them, even with the wildest dreams of increase in the size of Edmonton, for 30 or more years from this Viking-Leduc field and from this gas cap they would have another 20 years. Not taking into account all the other gas in the Redwater field. They have a very low oil-gas ratio in that field and it will not be producing any great amounts of gas until the pressure has dropped below the bubble point of the oil, which probably will be a good many years. Golden Spike might turn out to be one of the great fields of all times. We only know a little about that now. For this reason, we have left Edmonton out of consideration in any of our estimates of furnishing gas to the Province of Alberta because it already has an abundant supply and there will be gas in my opinion that will have to be blown out to the air at Leduc or some pipe line take it away from them. They can get it during the winter time. They can take that amount of gas and of course from Leduc in the summer time, Leduc would be furnishing more gas than the City of Edmonton would probably need. We have figured this 21 billion from Leduc which I would like and have considered as being one of the oil fields in that general neighbourhood. As it is preliminary evidence we cannot make a diagram of things that are far in the future, not just knowing where it is coming from. We do know there will be that amount of gas coming from that region and unless a very uneconomic method of disposing of the Leduc gas, which would be to pump it

back into another field and then produce it afterwards, was utilized, that gas would have to be wasted. The method of pumping the gas back is an expensive operation. The gas would have to be brought up to a high pressure and it really would be furnishing no benefit to Edmonton for another generation, and I do not think the people of Edmonton would enjoy paying extra money for their gas now with the doubtful prospect of it being a benefit to the next generation.

Coming down the line then - -

Q Before you do that, Mr. Dixon, would you say a word about the compressor station at Leduc, that little box, it shows on the side a formula which is repeated in respect to all other compressor stations? I think a word of explanation about that would be useful?

A In that little box to the right of Leduc is shown the line loss, station fuel, the amount of gas to be compressed. Then the compression ratio of the atmosphere to 450 pounds and the required horsepower, that is the amount of horsepower that is theoretically required. But as the horsepower comes in units for each station rather than for over 1000, we have figured how many units it will take so the installed is always more than the required.

(Go to page 892)

A I think it is self-explanatory. Now, starting then at Leduc we have a 16-inch line coming down to a point near Calgary. This small line, 18 miles long, from the 16-inch line to Calgary was put in because this will reach that point at a low pressure. The gas in Jumping Pound is at a very high pressure. Now, it did not seem reasonable to compress a large amount of gas and then have at a very close point nearby gas that is already compressed when Calgary does not want high pressure gas, so we figured it was cheaper to build a line into Calgary for the low pressure gas and take the Jumping Pound gas with its high pressure to the line.

Now this all now needs to be changed. It is on account of the fact that I understand the Shell Oil Company, who own Jumping Pound, and the Gas Company of Calgary, are entering into an agreement in which the City Gas Company here will promise to take 20 million cubic feet of gas per day on an 80% load factor at Jumping Pound and transport that gas to Calgary, and I suppose possibly to other points. Now, that will relieve the Grid System of supplying a certain amount of gas to Calgary. It is just the same, practically speaking, as if the Grid Company was doing it. I wish my good friend, Mr. Fenerty, was here because this is what is entering the question that I knew he was going to ask me. In this agreement they also promise to furnish gas above the 20 million a day in a case of a deficiency in Calgary. As I see, that will necessitate a change in the setup of our projected line here, but it is advantageous to everybody, they are bringing our gas to

Calgary and we do not certainly need to worry about any gas supply to Calgary for a great many years to come, although it will cut back into our contract with the Shell but we expect to take the excess gas over and above the amount that can be used by the City of Calgary.

We then come to a point where the line joins from the fields in the east. The general region we will call the Princess Field and the Pendant d'Oreille Field.

Oh, by the way, in estimating the deliverability of Jumping Pound, I have not yet received all of the information that I think is presently available and it has been promised to me and I think there will be before fall a great deal more information available in regard to that field. They will make some back-pressure tests on the well and I think we will be able to give a good and full report on what we think the Jumping Pound Field will do, but the facts are not at hand as yet to do that.

Now, in the case of the Princess Field and the Pendant d'Oreille Field, we plan to take on a peak day 60 million from the Princess Field and possibly 60 million from the Pendant d'Oreille Field, or the fields in that general neighbourhood. We will try to calculate the number of wells that will be needed to supply that amount of gas into the line.

Now, this brings up the general subject of the deliverability, which, of course, is in

direct connection with getting the gas into the line. Now just a little illustration of the thought of a company that is working and actually in operation. The Department of the El Paso with which I worked on reserves and deliverability has on its door: "Contract Department". They think of it as a series of contracts. There are so many different factors in trying to work out the deliverability of a field and it is subject to so many different things, that I think that is a very good title for that Department. Their duty is to keep the contracts up so that they always have enough gas into the line, and agreements must be made in advance.

Now in the case of the Princess Field at the present time we have a contract with them to supply 40 million a day plus 20% of the line capacity, we only having to take 65% of that 20%. I hope to have some tests made, or have the company make some tests, of the wells there, to take pressure tests so that we will be in a better position to figure the exact number of wells that will be needed to supply the 60 million a day into the line. We are negotiating with the Texas, Union, McColl-Frontenac interests, who have a large amount of interests in Pendant d'Oreille.

Now if we are taking gas from the Princess Field at the rate of 60 million a day, and the reserves there as estimated by Mr. Slipper are 370 billion, we would then, with 100% load factor, have about 16 years, I think. But of course, we will not be taking at 100% load factor, so that we could, with enough wells

completed, get that amount of gas into the line for a period of 25 or 30 years. The same thing applies to Pendant d'Oreille. I will mention that we have exactly the same contract with the Shell in the Jumping Pound Field but 20 million of that has been released for the use of the City of Calgary.

We now come to the Pincher Creek field. I have just received, the latter part of last week, a great deal of information in regard to the Pincher Creek Field. I have been talking to the Gulf people for a long time. They would like to sell, according to what they say, 150 million a day of pipeline gas. The calculations that I have show a production of 100 million a day but they say they could increase that. I do not see how we could take 150 million a day into this line from such a source without leaving out too much of the rest of Alberta, but we certainly have available - - I do not say we have available, because we have no contract, but there is available in the Pincher Creek Field for a very long period of time, according to the company's own calculations, 100 million cubic feet of gas per day.

Now the qeustion was asked during the Hearing about the amount of gas available from these fields in relation to the reserves. In the gas fields that have not enough gasoline in them to make it worth while to extract the gas, of course the entire amount of gas that comes out of the well is available to the pipeline except a very minute loss in the dehydration plant. In the case of a field such as Leduc or any casing head field for the gas

that is in solution before treatment there would be about a 25% loss. Due to the fact of the variation in the load, some of the gas is bound to be wasted, you just can not help it. You can not build a plant large enough and continually change it to the fluctuating load, which is almost invariably the case under proration. The producer starts on Monday morning to put gas in the line and finish up there as quick as they can. They may shut the well off at 12 o'clock and they generally get a great wad of gas coming in to the system in the early part of the week, or the early part of the month if it is on a monthly proration basis. In Texas they are trying to make rules and regulations to force the producers to take more care to have the amount of gas coming into a line more even so that it can be taken care of. No matter what happens you are bound to lose a lot, and I say 25% is a reasonable estimate of the amount of gas that will be lost just because you can not take care of it in a plant, and there would be another 5% loss due to the fact that you are taking the gasoline out of the gas.

Now in the case of Jumping Pound, that is a sulphur and carbon dioxide, which would have to be taken out. I do not know whether or not they can afford to take out the gasoline, whether that will be commercially feasible. That will depend on the price of gasoline but I would think about 12% in Jumping Pound would be a reasonable loss due to treatment for the sulphur and CO_2. In the case of Pincher Creek, which has a great deal of sulphur in it, and will take some CO_2, I estimate that

it will be a 20% loss from the raw gas that comes out of the field.

Now these fields are different from the field at Leduc or any other solution gas field in that these fields are producing distillate and gasoline and not crude oil.

In regard to our estimate in costs, we have a desulphurizing plant figure but now that cost is eliminated as in the Jumping Pound Field they are going to build a plant there, according to my information, a great deal larger, say 2½ to 3 times the 20 million capacity which is needed just to supply their contract. It does not cost so much more to build a big plant than a small plant and they are going to start off with a large plant, the exact size of which I do not know, but it will be greatly in excess of the 20 million contract. In the case of Pincher Creek we would not need to worry about building a sulphur plant there. In talking to Mr. Schweigert, the president of the Gulf, I suggested we would take and pay for all the gas just as it came out, even including the sulphur. In talking with the Freeport people they told me that was very valuable and could be taken out at a great profit. Unfortunately Mr. Schweigert knew that himself and he said they would take care of the sulphur, we need not worry about it at all, they expected to make considerable out of that. Also, a question was asked about the cost of dehydration. We figure $1500.00 to $2,000.00 per million cubic feet as the cost of installation of a

dehydrating plant.

Q Mr. Dixon, might I interrupt to ask you this, what you are telling us about this desulphurization plant would eliminate the $2,000,000.00 figure Mr. Goodbody gave us in his estimate?

A Yes, if the estimate is made that way I suppose it will be.

Q MR. D.P. McDONALD: In regard to Pincher Creek or Jumping Pound?

A Mr. Goodbody was mistaken. That was for both of them but now it is eliminated.

Q MR. MAHAFFY: Dehydration?

A No, not the dehydration. It must be everywhere and I think we will have to do that in a great many of these fields very close to the wells on account of the fact in very cold weather the hydrates will freeze them right up. We will have to have many dehydration plants. Now, I would like to go back and describe - -

Q MR. NOLAN: Mr. Dixon, may I interrupt again. Do I understand that Gulf would build their own desulphurization plant?

A Yes, unfortunately. We wanted to build it because it would be extremely profitable.

Q Shell will build their own?

A Shell will build their own.

Q So that both items are eliminated from our consideration of costs?

A Yes.

MR. C.E. SMITH: If they do.

Q THE CHAIRMAN: This 20% from Pincher Creek, does that cover sulphur and CO_2 or shrinkage?

A Shrinkage. Oh, outside shrinkage.

Q That is, there would be so much dry gas available for market, and 20% deduction would cover all the other factors, shrinkage, desulphurization, dehydration and so on, 20%?

A 20%. I hope to get some exact figures from the Gulf. I am taking this from calculations that were made on the desulphurizing and taking the CO_2 from a plant in Barko Dome near the Four Corners in San Juan Basin. Of course, this was considerable sulphur and the loss was considerably more than the amount of H_2S that is in the line. You have to multiply that by quite a figure in order to get the total loss. I think there is only 7% H_2S but you lose certainly a great deal more than that, and then you will have some shrinkage aside from that, and I think 20% is a reasonable estimate.

(Go to page 900)

Q Yes?

A Now, I have just been mentioning the subject of deliverability, I am sorry that I have not already worked out everything that is needed, but I think we can do that so much better after the development during the summer here, so that I would hate to put that in right now. Of course, we can figure, if we have a test by back pressure methods, you can then figure for a single well what the production is going to be under varying conditions in order to calculate the amount that a well that is to be drilled in the future is going to produce. We have to assume that it closely resembles the wells that have been drilled. But in this whole region from the Princess Field to the region of Pendant d'Oreille, as far as I know, there has been no production back pressure tests made on the wells, therefore it is very difficult to try to determine just exactly what an average well will be. We will do the best we can and try to determine the number of wells that are needed, and that would come according to our present knowledge, the spacing of the wells, and, of course, there is one great difficulty here, in that there are a great many other places where gas can be taken, and I imagine that whether we wanted to or not, and we certainly do want to, we will have to take gas from anybody that has gas within an economic reach of the line. But that will be in better shape to determine for the time being next Fall.

This type of work I have done for Commissions, for testimony and for the practical purpose of how big a line to build, and how many wells will have to be drilled, and what the pressure should be, the size of the

gathering system, and all such details, it is a regular form of computation, even when you have not got a great deal of information to go on. But, in any case, it is very helpful to determine that.

Now, if we go back to the history of other lines, I think it will show what has happened in other big lines being built, those that I know about, in regard to the deliverability and reserves. The El Paso line started with three wells, no other gas wells in the region. There were some oil fields with heavy sulphur wells within 50 miles, or a little less, but the gas wells that we were relying upon were just three at the time. Well, that brought a large and wonderful field. In my opinion, which was the basis of financing, there was an abundance of gas to supply that line for 20 years. Now, that field is being utilized as a storage field and the gas production has spread over hundreds and hundreds of square miles.

In the case of the Panhandle line, when the line was first projected and first financing started, according to my recollection, I may not be exactly right, but I do not think there was a single well drilled, owned or drilled, by the Panhandle line. There was a lot of land that we firmly believed would produce, and it has, all of it. But as of the time that the line started there were no wells at all under contract or drilled. They made contracts afterwards and drilled a vast number of wells.

In the case of the start of the United, that is, the line from Shreveport to Beaumont and Houston, there was a large number of small wells attached,

but we considered that we were in a big gas producing region, and it was perfectly evident that we could get all the gas that we needed, and it was hardly a worry to anybody. There was a lot of gas blown into the air around, but there was very little actually attached to the line or under the control of the company.

Q Mr.Dixon, do you know what the reserves are in the Panhandle under contract and owned?

A I think it is 3 trillion, but I may be mistaken in that. There was a large amount. They found they had more reserves than they wanted, and they took out reserves to make another company which is called the Hugoton Company.

Q Is it a fact that there was 3 trillion owned?

A Owned and under contract?

Q Yes?

A I am not certain. I cannot remember, but it is at least 3 trillion that they have under contract and owned. They have far more than their contemplated needs for a generation to come.

In the case of the Tennessee line there were fields then developed, had been standing for years with no outlet, and it was built to tie into that immediately proven area with wells without any further drilling, and they had an abundance of gas for that.

In the case of the Southern Natural Gas Company, they made a contract with the producers in the Monroe Field, and it was a comparatively small volume compared to the volume of gas in the Monroe Field. They had an absolute contract for all the gas they wanted, for the life of the Monroe Field. And I think that

shows the various conditions under which big pipe lines have started from a perfect reserve to practically none, but being in an oil and gas region.

The line from Corpus Christi to Houston, which was built by the Moody-Seagraves' Enterprises, which I mentioned we were working for, in our estimate of the reserve on which the financing was based on, we said there were no proven reserves, but it was in a gas region, and the pipeline made the gas. The line was financed and there was an abundance of gas through that line, and afterwards drilling was stimulated and they found a little oil, and they were blowing, we understood at the time, 500 million a day into the air over and above what the pipeline could take. Those were the days before there was any regulation on blowing gas into the air.

Now, I would like to turn to our other exhibit.

Q Exhibit 29?

A Which in the Northwest Natural Gas Company is Route B. We take the gas at a point near Pincher Creek at the compressor station at 750 pounds. On a peak day it would be around 300 million per day, and bring it along through to Kingsgate, which is not shown here, where it crosses the boundary into Idaho, and the first amount of gas/that is dropped off the line in any large quantity will be the line to Trail. You see we have a pressure of 656 at Newport. We have a pressure of 630 at Trail. That will give us an abundant pressure, so that we will not have to have a large line to go into Nelson or the other towns in that neighbourhood. Pardon me, there would be some gas dropped off going through Kimberley.

We have an indicated capacity there of 1 million, - 1,730 Mcf per day to supply Kimberley, with an indicated market of 1 million. There is some gas then dropped at Spokane. The line crosses the plains of Washington, and just before the branch going to Hanford there will be another compressor, and we can deliver at the borders of the restricted area 24 million a day at 600 pounds pressure. There is a small amount of gas dropped off at Wenatchee, and then the line crosses through the tunnel to Monroe, and a 22 inch line then goes to New Westminster. We have not shown any line going up the Fraser Valley, as we consider that a function of the local Gas Company to take care of that load. They did not want us to be taking any part of the business of distributing gas in their neighbourhood, which is entirely correct, and we agree with them there. We have not shown a branch going up there, and that would be part of the enterprise of the local gas distributing company. As you see, we have the ability to deliver at New Westminster at 604 pounds pressure, 36,382 cubic feet per day....

Q MCF?

A MCF per day, and you can see that our pressure is 604 pounds, which will enable them to take laterals off that line without any further compression to take care of the metropolitan area.

Then, going back, you can see where the line drops off gas at the various towns, and then we have from Monroe, going south, a line, a 20-inch line, which will drop gas nearby at Seattle, and then go on to Portland and deliver the gas at Portland at 100 pounds

pressure. As you can readily see, we have a very large capacity to supply the needs of the Vancouver metropolitan area,and we plan to guarantee to have available for Canada at least 25% of the capacity of the line, which is greatly in excess of what is indicated to us is the present market and is more than they have asked for.

Now, I would like to turn to our Route A.

MR.NOLAN: And may numbers be given, sir, first of all to Alberta. That would be Exhibit 30, Route A, would it not, sir?

THE CHAIRMAN: That is the Alberta Natural Gas Grid?

MR.NOLAN: Yes, sir.

THE CHAIRMAN: That will be Exhibit 30.

DESIGN OF ALBERTA NATURAL GAS GRID,
ROUTE A, MARKED EXHIBIT 30.

MR.NOLAN: And the second longer sheet on Route A will be Exhibit 31?

THE CHAIRMAN: Exhibit 31.

DESIGN OF ROUTE A MARKED EXHIBIT 31.

Q MR.NOLAN: Will you go on, Mr.Dixon?

A Now, you see, the Grid as far as the length of line is concerned in Route A is exactly the same, but the amount of gas that is to be delivered to the line is different, as there is less market on account of loss of the Hanford Works on this line.

Q And the difference is 300 million in Route B as opposed to 274 million in Route A?

A That is the difference in peak load, that is not the exact difference for average load. I do not think we need to go over this in detail, because everything is very much the same as the other, and everything said in regard to Route B applies here with just slightly different figures.

Q Yes?

A Then we come to the Alberta Natural Gas Company and the Northwest Natural Gas Company, which is Exhibit....

Q 31?

A As you see, in this one, we have taken off a smaller volume of gas, and bring it along the border of the United States and Canada on the Canadian side to New Westminster. The line then drops down to Bellingham, Seattle and Portland. Now, this line, as you can see, requires a great deal more compression, even for a smaller volume of gas, than the other line. That is because in place of getting at the middle of the market at Monroe, where the line to Washington would join the line running north and south, we have to push all of the gas through the 22-inch line, and then on to Portland. It would be the same from Seattle to Portland, but there is a great deal more compression needed to bring the gas, a larger volume of gas through the 22-inch line to Seattle. We have used what we consider rather low compression ratios, which is, I think, good practice, as that gives more flexibility when wanting to increase the throughput, and I do not think that there is any special thing needs to be said about this. It is all on the sheet.

Now, of course, when we have changed the set-up on the Grid to a certain extent, which will be inevitable, due to the developments during the summer, we

will need to present another schematic map showing what we would be doing then, but the position of the line in general we expect to have just exactly the same, unless another field comes in, which is possible, and may be highly probable, during the summertime, which might change our set-up. And then the contractual relations that we may be able to make, or the agreements, of what the various people would do, that, of course, will influence the movement of gas we cam take, the amounts of gas we can take from various places.

As I have said, we have a contract which now amounts to 30 million per day firm from the two companies, from the Shell and Standard of California, plus 40% of the capacity of the line. And we have received, which, I think, has been put in evidence, a letter from Imperial, showing they would be glad to sell gas in the Legal, in the general area of Legal, as soon as they are assured a gas well there would have a market. And we have had conversations with the Gulf in regard to Pincher Creek, but they have made no promises at all. All they say is they want to sell gas. And we have been in negotiation for two years with the Texas Union people that have the big holdings in Pendant d'Oreille, but we have nothing definite on paper with regard to that.

MR. C. E. SMITH: Mr. Nolan, have you got the contracts and the letter that Mr. Dixon referred to?

MR.NOLAN: The contracts were filed with the original application.

MR.C. E. SMITH: I thought you said there was something subsequent to that?

MR.NOLAN: Well, there are amended contracts, which have not yet been filed. There were three filed with the original application, one of them, the Imperial, was cancelled, and the letter really takes the place of that contract. We are amending our application in which we state that there have been amendments made to the other two contracts.

MR. C. E. SMITH: As I remember it, they are not much good unless they were extended.

MR.NOLAN: That is true. They have been extended. Negotiations are going on with a view to amendment. As soon as the amendments are completed, the contracts will be filed.

A I would like to state that we expect to be paying at the end of 5 years at least 10 cents for the gas, and, probably long before that we will be paying 10 cents and possibly considerably more for the gas to the producers. The amount of gas you can get from a field, which is really the deliverability, is a function of many things, and price is one of the most important. You can get a great deal more gas in a given time from a field if you pay enough money for it.

Now, one little field near Geneva, in New York, which was found in a suburban area, they drilled an enormous number of wells in a shallow field. It would have been a beautiful field if they had one well to the quarter section, but they exhausted it in no time at all. They were getting 25 cents for the gas, and everybody was trying to pull it out as fast as they could.

Now, your legal restrictions, they are a function of the deliverability. If you are only

allowed to drill one well to the section that means that your deliverability is confined to a certain number of wells. If you are allowed to drill one to a quarter section, then you can get a deliverability, at least at the start, of at least four times what you could get with one well to a section, and so on.

And the price that you are paying, and the general conditions, is something that needs to be really determined before you can figure on the deliverability. The deliverability of a field is not a neat figure of numerals that you can put down. Unless you can state the conditions exactly it is a variable, depending on a whole series of economic and physical factors. Of course, the amount of gas that you can take depends on the size and the pressure of your gathering system. If you want to, you can put in a large gathering system, a gathering system of large diameter pipe, and take the gas out very fast. If you are restricted to a percentage of the open flow, that holds back the deliverability, and then the general character of the field is not a thing that can be told immediately. Generally, a field is something, and each well is something unto itself. There is no such thing as a sort of standard well, and to apply formulas blindly without being based on experience is a very dangerous thing.

Q You made some mention of price, Mr. Dixon, and do I understand that price is an encouragement to drilling?

A Naturally.

Q Just elaborate on that a little, if you would, please?

A I was speaking of it in the relation of delivering the

gas into the line. If the price is high, the owners of the field are willing to drill more wells. They are also willing to step out and try to extend the field. And it also naturally encourages wildcatting to bring in new fields, both for the possibility of gas and aids those searching for oil, with the prospect if they do not get oil, they at least get their bait back by having a gas well.

Q Yes. Well, now, Mr.Dixon, is there anything else that you would like to add to what you have been telling us about the design of these two new lines?

A No, sir, I cannot think of anything right now.

MR.NOLAN: Then I am going to suggest, sir, that we might adjourn for a few minutes.

MR. STEER: Mr. Chairman, before the Board adjourns, as you know I appear for the Canadian Western Company. I am informed that a statement was made by Mr. Dixon this morning to the effect that a contract had been concluded.....

MR.DIXON: No, sir.

MR. STEER: .....between Canadian Western Company and the Shell Company. If I am misinformed then perhaps it is unnecessary for me to make the statement.I wanted the Board to know this, that negotiations have been going on for some little time between the Canadian Western Company and the Shell Company. I also want to say that those negotiations are still in progress, that no contract has been concluded, and that both the Canadian Western Company and the Shell Company realize that no such contract should be concluded without the approval of this Board,

nor will it be done, and possibly without the approval of the Public Utilities Board.

MR.NOLAN: Mr. Dixon, I understood you to say that negotiations were going on with a view to that?

A If I did not say that I mis-spoke myself. At least, I meant to say, what I meant to say was that negotiations were in progress.

MR. C.E. SMITH: Whether he did or he did not, I am glad to hear from Mr. Steer at last.

MR.NOLAN: Well, sir, perhaps we can adjourn.

THE CHAIRMAN: Yes, we will adjourn for fifteen minutes.

(Hearing resumed after short adjournment.)

(Go to page 912)

MR. NOLAN: Mr. Chairman and Gentlemen, there are one or two matters I would like to put to Mr. Dixon which I think would be useful and informative, so far as the Board is concerned. There has been some mention made here of the transfer of gas in bond. Do you know how that is arranged for, Mr. Dixon?

A No, but I am informed by counsel that the method would be that the Federal Power Hearing would be held before they could grant a certificate of convenience and extent and then that they would have to recommend to the President that a Presidential permit be given for the export of gas and another Presidential permit for the import of gas. I mean, there would have to be a Presidential permit for the import of gas and another Presidential permit for the export of gas, wherefor the gas would be taken in and taken out under Presidential permit. Counsel will give a legal opinion on that when the hearing is reconvened.

MR. NOLAN: What we proposed to do was take counsel's opinion and perhaps file them with the Board here, because that might be useful information and I am sure you would like to have it.

Q I was wondering, are these Presidential permits granted on the application of the Federal Power Commission?

A That is the way I understand it.

Q The applicant applies for a Presidential permit and that is heard before the Federal Power Commission and they recommend to the President whether a permit be or be not granted, is that so?

A That is correct.

Q Now, Mr. Dixon, I wonder if you would tell us something, in the light of your experience, about maintenance and its importance in pipe line construction, telling us the conditions under which maintenance is difficult and some of your experience of breaks in lines and what has to be done to remedy that sort of thing?

A I will do it very quickly. Of course, it is self-evident that maintenance is absolutely essential on a line. Nothing can be worse for any city than to have a break near the city and have the gas go out. It cannot then be turned on for maybe a few days on account of the fact that all people have to be notified. Men have to go around and see that all the pilot lights are turned out before the gas is turned on. All of the pilot lights are to be turned off before any more gas can be put in. Of course if the break occurs some distance from the city gas pressure can be maintained for some time, say for a couple of days. That happened in the case of the Panhandle line when a break had occurred in Oklahoma, or Arkansas rather, where a line was out for some time but there was enough pack in the line so it was hardly noticed at the other end of the line. In my experience the break is something that is just unforeseeable. You have high pressure on the line and it does not break and then you have low pressure on the line and it goes out. The movement of the ground was the cause of one very bad break on the line - that was the Panhandle line, very near to the City of Detroit. It was on a hillside and it slipped and the line was broken. But they maintained their service there because they had to shut off all industries and they

had a standby and were able to maintain their service. It is something that is just impossible, to build any line anywhere that you can be sure is not going to break, and the great thing is to make the time element as short as possible so that you can get to it with a great deal of speed and fix it in time to keep the gas going through.

Q Yes. Thanks, Mr. Dixon.

MR. NOLAN: Now, there are other matters that can be discussed but in view of the fact that we are adjourning for a long period of time, I thought that it might be convenient at this stage if Mr. Dixon would answer any question which either the Board or my friends would like to put to him. We thought that for the reason that perhaps in view of the long adjournment there are some things they would like to know now, so that they could make what preparation is required for the resumption of the hearing. I would be very glad now if either the Board or my learned friend would ask Mr. Dixon any questions with respect to these matters.

MR. MAHAFFY: My understanding is that Mr. Dixon will be back and will be available when called.

MR. NOLAN: Yes, you can rest assured that will be so.

MR. S. B. SMITH: In this situation, if I may be permitted, I would prefer to defer my cross-examination on the understanding that I am not to be limited in my cross-examination later by reason of not having exercised my privilege at this time.

MR. C. E. SMITH: May I say I thoroughly agree with

Mr. Smith and Mr. Mahaffy and probably Mr. McDonald, I imagine, because I anticipate he will have a number of questions to ask Mr. Dixon. May I go a little further and say this, not only would I like the opportunity of examining the transcript of the evidence already given, but I am assuming that well before Mr. Dixon is recalled that all of this will be submitted in written form. Particularly I am interested in getting some written submission with respect to the method of protecting the residents of this Province as they should be protected under the Act. And with respect to that, I am interested in the deliverability, not only generally, but with respect to each particular field, as they call it, in the Province, and more particularly, the fields that have been indicated here today. I just use this as an illustration of matters that I think will have to be discussed and I think, to give a further illustration, a number of which at least were discussed in the Westcoast application when my learned friend and I think Mr. Dixon sat throughout. I think we are all entitled to get the same written submissions as to all these matters and I presume they will be available before the Fall, so that we can deal with these as well as the transcript of the evidence presently given.

MR. NOLAN: I do not think there will be any difficulty about that, will there?

MR. DIXON: No, that is what we expected to do.

MR. C. E. SMITH: I am assuming that.

MR. NOLAN: We will do it. Well, sir, if counsel have no further questions and perhaps the Board - -

CROSS-EXAMINATION BY MR. D. P. McDONALD.

Q MR. D. P. McDONALD: It is not my intention to go into any detail on that submission made today or those that have been filed and which in some part were referred back, as it were, to Mr. Dixon. But I thought I could ask him one or two questions and then I would like the rest to stand over for completion. The only thought I had, Mr. Dixon, was that you mentioned you had considered the market in Seattle and in the Pacific Northwest Area?

A Yes.

Q And subsequent to that, a submission made by Mr. Copp was prepared and filed and read to us. Do you feel in accord with the submission made by Mr. Copp and the evidence he gave in regard to it?

A Yes.

Q I take it you also in your preliminary statement referred to the fact you had done a detailed personal investigation with regard to Route A and Route B and you have also heard the evidence by Mr. Copp and Mr. Swinerton?

A Well I would like - you may be giving a wrong impression because I went over the general territory, but I cannot say I now am familiar in detail that is necessary to speak any more than in a general way in regard to any of the routes. We have relied on those who have gone and done the detailed work.

Q Generally, then, you are in accord with the evidence that has been submitted?

A Yes, sir.

Q You also have heard a representative of the Ebasco Company and you are in accord with the evidence given by him with regard to the particular pieces of the pipe line which he

dealt with?

A In general, yes.

Q Now the only other thing that occurs to me, throughout the submission and again today, reference has been made to price and maintenance. I was wondering if you had prepared your operating statement. I do not just remember how you described it. Statement of Earnings and Management which would include, I presume, the operating cost?

A No, sir.

Q You have not prepared it?

A No, we could not do that until the project is more crystallized.

Q All I wanted to know from you is how you are able to provide the price in the field in the amount you mentioned if you have not prepared a statement of earnings and management?

A That is very simple.

Q Yes?

A That is the basis, one of the bases on which the other is decided. Our price is based now on our present contract and our contracts are that they will not pay anybody else any more for gas than we pay them. I think every other contract we make will have what we call a favoured nation clause in it. It is our expectation of living up to our contracts.

Q I understand then that the statement with regard to comparisons as between these lines A, B, C, D and E that you have referred to in the presentation made here this week have all been made without the preparation of a statement of earnings and management and operation?

A We have made, of course, for our own selves innumerable

calculations of operating costs, but we have nothing prepared in final form.

MR. NOLAN: If the Board has no questions I would like to ask Mr. Dixon to stand down on the understanding that he will be here to be cross-examined at the proper time.

THE CHAIRMAN: Yes.

MR. NOLAN: Thank you, Mr. Dixon. Now, sir, I told you yesterday we intended to amend our application. That has been necessitated by a change of circumstances since it was originally filed in August of 1949, that is almost a year ago. I have the document here and in order to accommodate my friends I will distribute copies of the amended application, if the Board will accept it. Perhaps it could be given a number then for the purposes of the record. That would be number?

THE CHAIRMAN: Exhibit 32.

AMENDED APPLICATION NOW
MARKED EXHIBIT 32.

MR. NOLAN: I thought I would read it, sir, if there is no objection on the part of the Board.

PROVINCE OF ALBERTA

Before

THE PETROLEUM AND NATURAL GAS CONSERVATION BOARD

AMENDED APPLICATION FOR PERMISSION TO REMOVE OR CAUSE TO BE REMOVED NATURAL GAS FROM THE PROVINCE OF ALBERTA, UNDER THE PROVISIONS OF THE GAS RESOURCES PRESERVATION ACT.

TO THE PETROLEUM AND NATURAL GAS CONSERVATION BOARD:

Come Now, Alberta Natural Gas Company, Northwest

Natural Gas Company and Alberta Natural Gas Grid, Ltd., and respectfully, with leave of The Petroleum and Natural Gas Conservation Board, amend the Application heretofore filed by Northwest Natural Gas Company and Alberta Natural Gas Grid, Ltd. by substituting this Amended Application in lieu of said Application and herewith apply for permission, pursuant to the provisions of The Gas Resources Preservation Act, to remove or cause to be removed natural gas produced in the Province of Alberta, and in support of said Amended Application show unto the Board:

1. Alberta Natural Gas Company, Northwest Natural Gas Company and Alberta Natural Gas Grid, Ltd. have offices at 8 Canada Permanent Trust Building, City of Edmonton, Province of Alberta.

2. Alberta Natural Gas Company is a corporation duly organized and existing under a special act of the Parliament of Canada with powers to transport natural gas inter-Provincially and internationally under the provisions of The Pipe Lines Act, Chapter 20, Statutes of Canada, 1949.

Northwest Natural Gas Company is a corporation duly organized and existing under the laws of the State of Delaware, United States of America, on February 26, 1946, for the purpose of investigating the possibilities of transporting natural gas from the Province of Alberta into the Province of British Columbia and into the States of Washington and Oregon, so as to supply the gas requirements of distributing companies in the Cities of Vancouver and Trail, in the Province of British Columbia; Seattle, Spokane and

Tacoma, in the State of Washington; and Portland, Oregon; and in other municipalities in Canada and in the United States; and of industrial customers along the route of the pipe line, including The Consolidated Mining & Smelting Company of Canada, Limited at Trail and Kimberley, British Columbia.

Alberta Natural Gas Grid,Ltd., is a corporation duly organized and existing under the laws of the Province of Alberta with powers to gather gas from various fields in the Province of Alberta and to make gas available to various distributing systems and industries within the Province, as well as to deliver gas to trunkline systems for export without the Province.

3. These Applicants are of the opinion, based on their own studies, reports presented at the hearings before The Natural Gas Commission, developments since the hearings, reports presented at hearings before this Board and the present continuing developments, that there is natural gas in the Province of Alberta far in excess of the present and future needs of the Province, and that part of this surplus could be transported outside of the Province without adversely affecting the availability of natural gas to consumers in Alberta.

4. The project of these Applicants is to buy and gather gas in the Province of Alberta and transport it by pipe line to Trail, Vancouver, Tacoma, Seattle, Portland and Spokane and intermediate points.

5. The project of these Applicants calls for the installation within the Province of Alberta of extensive facilities for processing, gathering and transporting gas, which would constitute a grid system. They are prepared to build such a system which would connect the important gas pools in the Province, which are not now connected, with distribution facilities in the various towns and cities of the Province, or they are prepared to build such other type system as will meet with the approval of the Board and is economically feasible and will provide points favorable for export without the Province. Alberta Natural Gas Grid, Ltd. will own and operate the grid system.

The Gas Resources Preservation Act states that the intent, purpose and object of the Act is to effect the preservation and conservation of the oil and gas resources of the Province and to provide for their effective utilization, having regard to the present and future needs of the residents of the Province. The grid system herein proposed will make possible the achievement of such intent, purpose and object for the following reasons:

(a) It would connect large known gas and oil pools with each other and would integrate most of the gas reserves of Alberta.

(b) The existence of a market for natural gas such as will be created by the proposed grid system will stimulate the exploration for and development of oil and gas fields throughout the Province.

(c) The distillate fields of Jumping Pound and Pincher Creek would have a market for their gas, and these fields could then produce large amounts of distillate and natural gasoline without waste of natural gas.

(d) Casinghead gas could be utilized from the recently developed large oil fields in the Province, thus avoiding the present waste of flare gas.

(e) A large market for natural gas would be established for the gas fields of Southeastern Alberta.

(f) The north end of the projected line would be within easy reach by pipe line of the general region of Athabasca. If large reserves of natural gas should be developed there, any gas pool or pools discovered in that area could be connected and integrated with the other pools reached by the grid system and become part of the gas reserves available for the utilities, industries and export transmission pipe lines being served by the grid system.

(g) With such a system installed, many communities in the Province could be served which are now without natural gas.

(h) The present pipe line systems serving Edmonton, Calgary and Lethbridge could be connected with transmission lines of large capacity, which could be used either in an emergency or for an additional gas supply to these communities.

(i) It would eliminate the need for the Calgary system to make extensive investments for additional facilities

and reserves, at the ultimate cost of the consumers, in order to have proper supplies of gas for the people at all times.

6. In planning a grid system such as outlined abuve, Applicants have considered that the following conditions are inherent:

(a) That there must be sufficient reserves of natural gas for the present and future needs of the residents of the Province of Alberta before an export permit may be granted, and that then other Canadian users will be granted priority over users in the United States.

(b) That, in order to finance the projected line, it is necessary that a firm supply of natural gas be provided over a period suffucient to amortize the debt which may be incurred to provide construction funds.

(c) That the grid system should be capable of supplying natural gas to other than Applicants for Alberta utilities and industries and for export to the East.

Applicants propose consideration be given to the following points in connection with this Application:

(1) That this Board designates the gas pools, or part of them, owned by the parties with whom Applicants now have gas purchase contracts or obtain gas purchase contracts prior to the completion of the hearing on this amended Application as the sole source from which Applicants may obtain gas for export.

(2) If the proposal in subparagraph (1) above is not satisfactory, that then this Board designate other pools, in addition, as contemplated by Section 8 of The Gas Resources Preservation Act, from which Applicants may obtain gas for export.

(3) The grid system as proposed by Applicants could, with only slight alterations in design and some comparatively small extensions (which alterations and extensions Applicants are willing to make), supply or transmit natural gas to adjacent distributing systems in the Province of Alberta and could supply all or part of any natural gas needed by a transmission pipe line going East from Southern Alberta.

7. All main line transportation in Canada will be through lines to be owned by Alberta Natural Gas Company, which will take delivery of gas from Alberta Natural Gas Grid, Ltd.

8. The diameter of the main pipe line of Alberta Natural Gas Company will be 24" o.d. It is planned to use a working pressure of 750 lbs. per square inch gauge. Compression stations will be placed at intervals along the main line.

9. The main transmission pipe line which Applicants seek permission to build, and which will be owned and operated by Alberta Natural Gas Company as pointed out above, will have an intake capacity at the connecting point with the grid system of 265,000,000 cubic feet daily. It is

estimated that deliveries on an annual basis will be such as to make it possible to accept delivery at said point on a load factor of approximately 75 per cent, which would make the average take approximately 205,000,000 cubic feet per day. This Application seeks permission to export a maximum of 80 billion cubic feet per year for twenty-five years.

10. Applicants have contracts with Shell Oil Company of Canada, Limited and California Standard Natural Gas Company for natural gas. Copies of said contracts were submitted and made part of the original Application. These contracts give the particulars as to the terms and rate of all existing contracts and agreements for the exportation of natural gas.

The contracts with Shell Oil Company of Canada, Limited and California Standard Natural Gas Company have been renewed, and Applicants expect they will be amended. When amendments are made, copies thereof will be submitted. The contract with Imperial Oil Limited has been terminated, but Imperial Oil Limited has agreed to sell Applicants such gas as it may have in the event an export permit is granted to Applicants. Gulf Oil Company of Canada, Ltd. has stated to Applicants that it will negotiate for the sale of gas upon certain conditions being met.

11. Applicants have associated with them in the United States responsible banking firms which are prepared to arrange for financing in an amount sufficient to pay for

the construction of the entire pipe line system. They are:

Morgan Stanley & Co.
2 Wall Street
New York 5, N.Y.

W. C. Langley & Co.
115 Broadway
New York, N.Y.

Dominick & Dominick
14 Wall Street
New York, N. Y.

Moore, Leonard & Lynch
Union Trust Building
Pittsburgh, Pennsylvania.

Applicants also have associated with them responsible banking firms in Canada which are prepared to consider joining in the raising of the necessary Canadian funds to carry out the project. They are:

A. E. Ames & Co., Limited
320 Bay Street
Toronto, Ontario

Dominick Corporation of Canada
360 St. James Street West
Montreal, Quebec

Greenshields & Co. Inc.
507 Place D'Armes
Montreal 1, Quebec.

James Richardson & Sons
367 Main Street
Winnipeg, Manitoba

Tanner & Co., Ltd.
Lancaster Building
Calgary, Alberta.

12. Exhibit "E" to the original Application contains information which Applicants submit for the consideration of the Board as contemplated by Section 5 (2) of The Gas Resources and Conservation Act. Additional information will be submitted at the hearing.

13. Northwest Natural Gas Company appeared before The Natural Gas Commission, consisting of R. J. Dinning, Esquire, A. Stewart, Esquire, and R. G. Marler, Esquire, Commissioners, and filed a Submission with said Commission, a copy of which Submission was filed with the original Application and is incorporated herein by reference.

14. Applicants, as the holders of contracts to purchase natural gas in the Province of Alberta, respectfully subject themselves to all of the provisions of The Gas Resources Preservation Act and respectfully pray that a permit may be issued to them to export or cause to be exported as outlined above a maximum of 80 billion cubic feet of natural gas per year for twenty-five years.

ALBERTA NATURAL GAS COMPANY,

NORTHWEST NATURAL GAS COMPANY
and

ALBERTA NATURAL GAS GRID, LTD.

Per "H. G. Nolan"
H. G. Nolan,
Counsel for the Applicants.

Now, sir, I want to offer some formal proof.

MR. C. E. SMITH: I wonder, before Mr. Nolan leaves that, if he could advise the Board and the rest of us what changes he has made in the Amended Application with respect to the original one. I have been trying to follow it but he read so fast I could not read the two documents at once. I notice that the 290 billion is changed to 80 billion and

there are some other changes. These are because you are a Dominion company having now got a charter, I take it. Is there anything the Board should know about?

MR. NOLAN: Yes, the amount of gas was not definitely stated in the original submission. It is now set out at 80 billion cubic feet in paragraph 9 on page 11 of the Amended Submission.

MR. C. E. SMITH: In the original it says that the Applicant seeks permission to export a maximum of 220 million cubic feet per day for 30 years. That is now changed to 80 billion for 25.

MR. NOLAN: No, it is changed to 265 million cubic feet daily, making a total of 80 billion cubic feet per year, a maximum of 80 billion cubic feet per year for 25 years, as opposed to 30 years in the original application.

MR. C. E. SMITH: Is there anything else you have in mind, Mr. Nolan?

MR. NOLAN: There were references to the Alberta Natural Gas Company in the original application. There was permission sought to permit them to be joined at such times as they were in a position legally to be joined and that leads me to what I propose to do now, if I may, sir. It will only take a moment, and that is to offer in evidence the Certificate of Incorporation of the Northwest Natural Gas Company, signed by the Secretary of State of the State of Delaware. I would like that to have a number.

DOCUMENT IN QUESTION IS
NOW MARKED EXHIBIT 33.

I offer in evidence certificate of the registrar of joint stock companies of the Province

of Alberta dated the 24th of November, 1949, certifying that the Northwest Natural Gas Company Limited is registered under Part A of the Companies Act of the Province, which, as you well know, entitles it to do business here.

DOCUMENT IN QUESTION IS
NOW MARKED EXHIBIT 34.

I also offer a certificate from the registrar of joint stock companies, dated the 19th day of August, 1949, a certificate that the Alberta Natural Gas Grid Limited is incorporated under the Companies Act of the Province of Alberta as a limited company.

DOCUMENT IN QUESTION IS
NOW MARKED EXHIBIT 35.

And last but by no means least, I offer to this Board a certificate of the Clerk of the Parliaments, who is the custodian of the original Acts of the Legislature of the late Provinces of Upper and Lower Canada and of the late Province of Canada, and of the Parliament of Canada, certifying that there is attached to this certificate a true copy of the original Act passed by the Parliament of Canada in the session thereof held in the 14th year of His Majesty's reign and assented to, in His Majesty's name, by the Governor General on the 1st day of June, 1950.

MR. C. E. SMITH: You should have added "notwithstanding the filibustering".

DOCUMENT IN QUESTION IS NOW
MARKED EXHIBIT 36.

MR. NOLAN: Now, sir, I think you will recall that I promised Mr. MacDonald of Edmonton that time would be made available to him and I met him early this morning and he is here with a representative of the City of Edmonton, and with your permission I will conclude my part in this Hearing and turn it over to Mr. MacDonald.

DUDLEY BLAIR MENZIES, having been first duly sworn, examined by Mr. Macdonald, testified as follows:

Q Mr. Chairman, I would first wish to acknowledge most sincerely the courtesy of Mr. H.G. Nolan in permitting the City to come in at this time, and also his associate, the Northwest Natural Gas Company. And I further think, sir, that it is an appropriate moment for Edmonton to acknowledge our thankfulness to Calgary for having through so much of the Hearing to date seen fit to be represented by Mr. L.H. Fenerty, K.C., of Calgary. We in Edmonton wish him well and trust that his health will permit him to return to assist you in these matters in the not too distant future. Mr. Menzies, have you been sworn?

A I have, yes.

Q And your full name is what, sir?

A Dudley Blair Menzies.

Q And what is your position with the City of Edmonton, Mr. Menzies?

A I am one of two appointed Commissioners.

Q And the third Commissioner is who?

A Is His Worship, the Mayor.

Q An elected official?

A Yes, elected.

Q And the Commission Board then consists of three?

A Correct.

Q Do you personally specialize in any phase of the city's business, Mr. Menzies?

A I am directly associated with the five utilities that the city operates.

Q And what are your professional qualifications?

A I am a civil engineer, a member of the Alberta Professional Engineers Association.

Q Are you in any sense an expert or specialist on questions of oil and gas supply in Alberta?

A I am not.

Q Can you say whether or not the Edmonton City Council decided to make any representations to the Alberta Petroleum and Natural Gas Conservation Board on the question of the export of gas from Alberta?

A That is correct, yes.

Q And has that submission been prepared?

A It has, yes.

Q You have it with you?

A I have it with me.

Q If the Board is agreeable, would you place this submission before it.

THE CHAIRMAN: Exhibit 37.

BRIEF OF CITY OF EDMONTON PUT IN AND MARKED EXHIBIT 37.

Q MR. MACDONALD: Before Mr. Menzies commences reading, sir, and in order to avoid confusion inasmuch as I was permitted to file on behalf of the City an application on Wednesday of last week, I wish to point out that what is now before this Board is an amplification of what was then presented. There is certainly no additional information.

Nothing that was in it before has been deleted but some additional material has gone in.

A If I may, I will read directly from the submission.

Edmonton, Alberta.

To the Chairman and Members of the Petroleum and Natural Gas Conservation Board:

Re: IN THE MATTER of the Gas Resources Preservation Act being Chapter 2, Statutes of Alberta, 1949, (2nd Session);
AND IN THE MATTER of certain applications thereunder for export of Natural Gas from the Province.

At the request of the Council of the City of Edmonton we now submit to you a memorandum expressing the viewpoint of the Council of the City with regard to the general question of the export of natural gas from this Province. To this submission is appended data dealing with the growth of Edmonton as we feel that it directly affects the amount of natural gas needed here.

At the hearing conducted by the Dinning Commission the City presented a brief urging that the exportation of natural gas from this Province be not permitted unless it was proven by evidence satisfactory to the Commission that sufficient natural gas reserves are available for the requirements of the Province for at least 50 years in the future. At the time of the Dinning Commission hearing the City had 50 years only in mind but we think that the Calgary request for a continuous 50-year supply is a better basis.

The City then further urged that exportation should be permitted only upon the following

express conditions:

1. That export should cease if at any time the Alberta reserves were being depleted too rapidly.
2. That in no event should the rate charged to domestic consumers in Alberta be increased by reason of permission to export gas.

With the data already presented to the Conservation Board by two export applicants in mind, we wish to enlarge upon these two submissions.

Firstly, we note that potential consumers of export gas in the Pacific North West have only been requested to forecast their estimated requirements for a five year term. This statement, incidentally, was made prior to our having heard what Mr. Nolan put into the record this morning. He was much more definite, I understand, than anything that had been previously submitted. Yet no one has suggested that any purchaser of export gas would contract or finance on the basis of a supply that was only guaranteed for five years. It seems clear that what prospective customers want is a supply assured to them for twenty or twenty-five years. We believe that estimates of a five year demand provide insufficient data to let Albertans know what we may be getting into in the way of export demands.

We understand the position of the export applicants to be that a permit to export will be the signal for a wide exploration for gas and a much more intensive development of proven or probable gas reserves. This has been the experience in the United States and it

does seem reasonable to expect the same trend in Alberta. Is it not then possible to develop an export formula based upon this trend? If the gas reserves needed for Alberta's present purposes and its reasonable requirements were guaranteed by the 'ear-marking' for Alberta needs of those fields which can meet such Alberta requirements economically, then perhaps export gas flowing to outside markets from new wells in areas at present unproven would benefit Alberta without involving any hazard for Alberta's present and potential gas consumers. To put it another way - - what we do not wish to see is export gas drained off from proven areas that are at present logical supply sources for Alberta cities and towns and businesses with the result that in years to come their requirements have to be piped in from greater distances at higher delivered cost.

So far as we are aware, neither applicant has asked permission to export a specific amount of gas over a specified period of time. That statement is now no longer correct in view of Mr. Nolan's remarks.

MR. NOLAN: It never has been correct.

THE WITNESS: We suggest that this situation makes it vital for the Alberta Government to stipulate that export contracts, if any, include a reasonable and predetermined quantity ceiling from the first. An export permit should not be a 'blank cheque' as to amount.

We further submit that the price of gas to domestic consumers will be increased if a gas export permit is granted unless the Alberta Government

provides protection from this risk. To document this opinion we cite the experience in the Hugoton-Amarillo Gas Fields which contain the largest known natural gas reserves in the United States. There, since a number of pipelines have tapped the fields the price for gas at the fields has gone up from 1 cent per 1,000 cubic feet in 1926 to an average price of 5½ cents per 1,000 cubic feet paid by the various pipeline companies in 1948. An advance in the domestic gas prices attributable to export could more than counterbalance the Provincial Government revenue resulting from export.

The attached data brings up to date the information given to the Dinning Commission by the City. It shows the percentage increase in population and in residential buildings using 1945 as the basic or commencement year. These figures show a population increase of approximately 23% and a residential building increase of approximately 32% in the four year period - 1946 to 1949 inclusive. The conclusion to be derived from these figures is that (assuming the percentage increase remains constant for the next ten years) the end of 1960 should find the population of Edmonton to be in excess of 200,000 by several thousand. It is apparent that the actual increase may be above or below the present and quoted rate of increase but the figures cited provide the best forecast obtainable at this time. When considered in conjunction with oil refinery and general oil business development it seems reasonable to forecast that the increase in growth will continue for at least several years.

Q MR. MACDONALD: May I interrupt you at that point, Mr. Menzies. Based on your own experience, have you any information regarding that latter statement? Do you consider it over-optimistic, conservative, or have you an opinion upon it?

A Well, later on in the second part of this report there are statistics to show the population increase, and you will notice that these figures are based on 4-year groupings. Now, actually that is not the common way in my experience of forecasting population. It is generally on a year-to-year basis but by taking it in groups of 4 we have given you a conservative figure in my opinion. I really intended dealing with this when I arrived at it.

Q Perhaps you could go ahead and deal with it then, sir.

A When I get over to the later data.

After the report of the Dinning Commission was submitted to the Provincial Government the Gas Resources Preservation Act, being Chapter 2 of The Statutes of Alberta, 1949 (2nd Session), was passed providing that any applications for the exportation of natural gas should be heard by your Board.

Some time ago the question of whether the City should be represented at the hearing of applications before your Board was raised in City Council. By written report dated 10th April, 1950, we, the City Commissioners, made certain recommendations and suggestions to Council (a copy of which is attached) pointing out:

(1) The declared intention of the Act.

(2) The duty of the Board under the Act to refuse a gas export permit unless the gas to be exported is surplus to Alberta's present and future needs.

That is an important section in our opinion.

(3) That the holder of an export permit may be called upon to divert the export gas to Provincial needs.

(4) The right of the Board to hold a rehearing at any time with regard to any permit issued.

(5) The final reservation to the Cabinet of control over export of natural gas.

The City Commissioners further pointed out to City Council that unless the City was prepared to offer evidence as to the existing and potential natural gas supply or evidence on other phases of these applications then representation by Counsel at the hearings appeared unnecessary. Having considered these points, City Council by resolution authorized the Commissioners on behalf of the City to submit to your Board a statement indicating the City's concern with the questions of natural gas supply and with the possible effect of the export of gas upon the price of gas in this City.

We respectfully point out that although the City has no special counsel appearing at the hearings before your Board that it is in no sense due to any lack of appreciation by Edmonton of the importance to its citizens of the question of the export of natural gas. However, we consider that unless the City can assist the Board by producing evidence as to the existing and potential

gas supply or as to any other phase of the applications, then representation before the Board appears unnecessary as unlikely to increase the total of informed estimates upon the technical and difficult and probably contentious question lying at the core of this inquiry, namely - the extent and the life span of a gas supply which cannot be seen, nor weighed, nor measured. We also further stress that the duty of the Board itself (as we see it) is to be satisfied from the evidence produced to it that there is sufficient SURPLUS gas to justify export and we understand that the Board is engaging engineers to enquire into the present and potential natural gas supply in the Province and every other matter relevant to the question of 'surplus' gas export.

Statistics concerning the City's population growth, the increase in the bank clearings between the years 1914 and 1949, and the value of building permits issued over the past twenty-four years, are attached.

Should the Board desire to obtain any information from the City touching any question before the Board the City will be pleased to furnish such information if within its power to do so.

Respectfully submitted,

THE CITY OF EDMONTON

Per: D. B. Menzies,
COMMISSIONER.

June 9th, 1950.

The next two pages are actually statistical and I have no comments to make other than to point out that they very definitely indicate the rapid trend in rate of growth of the City and particularly in the last three or four years. The same thing appears in the bank clearings and the building permits.

THE CITY OF EDMONTON

BANK CLEARINGS

1914,	$ 157,308,683
1915,	105,824,951
1916,	114,345,955
1917,	142,606,772
1918,	171,015,066
1919,	233,066,784
1920,	294,873,361
1921,	260,288,619
1922,	234,211,250
1923,	217,371,339
1924,	220,529,390
1925,	239,350,281
1926,	259,611,173
1927,	286,632,846
1928,	351,325,041
1929,	358,961,731
1930,	292,550,899
1931,	237,843,012
1932,	194,356,929
1933,	173,437,240
1934,	189,164,864
1935,	199,411,079
1936,	197,022,175
1937,	206,183,407
1938,	202,303,575
1939,	201,977,800
1940,	217,964,792
1941,	265,023,348
1942,	323,049,992
1943,	433,430,208
1944,	486,241,682
1945,	519,306,233
1946,	635,178,105
1947,	699,452,974
1948,	866,718,439
1949,	1,020,493,676

OFFICE OF THE CITY COMPTROLLER,
EDMONTON, ALBERTA.

B-2-11

D. B. Menzies,
Dir. Ex. by Mr. Macdonald.

THE CITY OF EDMONTON

POPULATION

TOWN

	1891	300	approx. (Journal)
	1894	1,638	
	1899	2,212	City Census
	1900	3,000	approx. (Council Minutes)
x	1901	4,176	Dominion Census
x	1903	6,995	

CITY - Prior to Amalgamation

x	1906	14,088
x	1909	27,000
x	1911	31,064

N.B. - "x" includes Strathcona

CITY - Since Amalgamation (Amalgamation came into effect February 1, 1912.)

1912	53,611	
1913	67,243	
1914	72,516	
1915	59,339	
1916	53,846	
1917	51,000	
1918	53,000	
1919	60,000	
1920	63,000	
1921	58,627	(Dom)
1922	60,000	
1923	60,000	
1924	63,160	
1925	65,378	
1926	66,415	(City) 64,740 (Dom.)
1927	67,083	
1928	69,744	
1929	74,298	
1930	77,557	
1931	79,059	(City) 78,829 (Dom.)
1932	78,387	
1933	79,231	
1934	79,773	
1935	81,621	
1936	85,470	(City) 85,696 (Dom.)
1937	87,034	
1938	88,887	North Side 69,152; South Side 19,735
1939	90,419	North Side 70,175; South Side 20,244
1940	91,723	North Side 71,102; South Side 20,621
1941	93,924 (Dom.) - 93,817	North Side 72,658; South Side 21,266

THE CITY OF EDMONTON - POPULATION - Cont.

1942 - 96,725
1943 - 105,536 North Side 81,722; South Side 23,814
1944 - 108,416 North Side 83,379; South Side 25,037
1945 - 111,745 North Side 86,053; South Side 25,692
1946 - 114,976 North Side 87,173; South Side 27,803
1947 - 118,541 North Side 89,457; South Side 29,084
1948 - 126,609 North Side 94,181; South Side 32,428
1949 - 137,469 North Side 101,390; South Side 36,079

THE CITY OF EDMONTON

BUILDING PERMITS 1925 - 1949

Year	Value
1925, ...	$ 1,481,890
1926, ...	1,853,735
1927, ...	2,568,565
1928, ...	3,374,971
1929, ...	5,670,185
1930, ...	4,300,935
1931, ...	1,377,175
1932, ...	1,093,045
1933, ...	428,565
1934, ...	479,108
1935, ...	676,535
1936, ...	895,440
1947, ...	865,560
1938, ...	2,806,340
1939, ...	1,661,109
1940, ...	2,636,870
1941, ...	3,422,925
1942, ...	3,367,720
1943, ...	6,720,130
1944, ...	5,759,105
1945, ...	7,988,348
1946, ...	15,020,453
1947, ...	13,182,665
1948, ...	27,123,329
1949, ...	40,050,063

D. B. Menzies,
Dir. Ex. by Mr. Macdonald.

RE: Exportation of Natural Gas

The availability of natural gas enhances and increases the attraction of Edmonton for industries, business, and residential uses. This applies not only to Edmonton but to the Province of Alberta as a whole. Particularly with industry, a major factor when considering gas as a fuel is whether or not the natural gas will be available over a long period. Where a large capital investment is made premised upon the availability of natural gas it follows that every step should be taken by the Province to insure that the supply is available for as long a period as is possible. We have now the situation in our sister province of Ontario where the supply for domestic consumers is far from sufficient for the purposes of that province and where in consequence a substantial portion of the natural gas consumed has to be imported. It is the concern of the City Council of the City of Edmonton that all measures possible shall be taken to insure that this great natural resource continues for a maximum period to be available to the citizens of the Province of Alberta. It follows that the question of exportation of 'surplus' gas is a subject of deep concern to the inhabitants of Edmonton.

The following statistics show the growth of Edmonton commencing with the year 1946. It is submitted that these figures give some indication of the possible future development of Edmonton and hence are an indication of the natural gas reserves necessary in order

to accommodate the needs of this area of Alberta.

POPULATION

		% Increase Over 1945	% Increase Per Annum
1939, ...	90,419		
1944, ...	108,416		
1945, ...	111,745	100%	
1946, ...	114,976	102.89%	2.9%
1947, ...	118,541	106.08%	3.2%
1948, ...	126,609	113.30%	6.9%
1949, ...	137,469	123.02%	8.9%

NOTE: The percentage of increase in population for the 4-year period commencing with 1946 and ending with 1949 is 23% over the 1945 population figure.

NUMBER OF RESIDENTIAL BUILDINGS

			% Increase Per Annum
1943, ...	19,660		
1945, ...	21,641	100%	
1946, ...	23,173	107.08%	7.08%
1947, ...	24,922	115.16%	7.5%
1948, ...	26,687	123.31%	7.2%
1949, ...	28,565	131.99%	7.2%

NOTE: The percentage increase in residential buildings using 1945 as the base and commencing with the year 1946 is approximately 32%.

Now, I would like to draw your attention to these two tables here. You will notice in comparing years there is a percentage increase over 1945 and then there is a percentage increase per annum. In one

case the year is taken at 1945 and the indices are struck accordingly but in my opinion, in forecasting future population, the percentage increase per annum is a more significant figure because I think it is generally agreed the populations are more inclined to follow a geometric increase rather than an arithmetic increase. An arithmetic increase is a straight line increase whereas a geometric increase is where you compound the rate of the previous years every year, and in arriving at our estimate of 200,000 for 1960 we have really compounded over a period of 4 years, which I feel is conservative, if anything. The same argument applies with respect to residential building.

It is submitted that a logical conclusion from the above figures (accepting the premise that the percentage increase in population will continue at a relatively steady rate for the next 10 years) is that by the end of 1960 the population of Edmonton will exceed 200,000.

COMMERCIAL MANUFACTURING AND INDUSTRIAL DEVELOPMENT

As commercial and industrial buildings are so diverse in character it is not possible to record in statistical form the yearly increase in the number of such buildings within Edmonton. However, the following business assessment figures for Edmonton give an indication of the very great increase that has occurred since 1939.

BUSINESS ASSESSMENT

1939	3,048,280.00
1944	3,444,597.22
1948	5,002,050.00
1949	5,626,696.00

All the literature issued by the City of Edmonton with the object of attracting industry to this district has stressed the availability in Edmonton at low rates of an ample supply of natural gas. The Industrial Commissioner for the City of Edmonton is of the opinion that the presence here of natural gas available at reasonable rates has been a large determining factor in the decision of certain firms to establish in Edmonton or the vicinity of Edmonton.

Another indication of the growth of the Edmonton area and its consequent increasing need for natural gas is indicated by the following figures:

LAND AND BUILDING ASSESSMENT

1948	89,379,460
1949	99,724,905
1950	119,542,800

A re-assessment of land has been made in Edmonton in time to be recorded in the 1950 assessment but it will be noted that even between 1948 and 1949 the increase in land and building assessment exceeded ten millions of dollars.

The following figures have been kindly supplied to the City by Northwestern Utilities Limited and deal with gas consumption in Edmonton commencing with the year 1940. They show the steady upward trend in Edmonton consumption of natural gas.

		M.C.F.	TOTAL	% Increase Per Annum
1940	Domestic	1,929,536		
	Commercial	1,307,041		
	Industrial	586,510		
1944	Domestic	2,966,064		
	Commercial	2,610,957		
	Industrial	1,332,130		
1945	Domestic	3,679,254		
	Commercial	2,984,691		
	Industrial	1,557,807	8,321,752	
1946	Domestic	4,042,122		
	Commercial	3,093,670		
	Industrial	1,359,156	8,494,948	2%
1947	Domestic	4,685,728		
	Commercial	3,498,172		
	Industrial	1,342,457	9,526,357	12%
1948	Domestic	5,347,931		
	Commercial	3,998,681		
	Industrial	1,459,850	10,806,462	14%
1949	Domestic	5,853,567		
	Commercial	4,308,066		
	Industrial	1,682,288	11,843,921	9%

I would like to just stress the words "in Edmonton" because tied in with our pipeline system is the line going to the south to feed Red Deer and those other lines and the total amount of gas going through that system is larger than the figure shown for Edmonton proper.

This tabulation it should be noted gives gross consumption in Edmonton alone at the end

of 1949 of 11,843,921 M.C.F. However, it will be remembered that the Northwestern Utilities figures filed as Exhibit 42 during the hearing of the West Coast Transmission Company application show that the Edmonton Gas Company used in 1949 from the Viking-Kinsella field a gross amount for its whole system of 14,970,000 MCF.

We invite the Conservation Board to accept the lowest quoted estimate on the reserve of gas in the Viking-Kinsella field, namely: the Ralph E. Davis figure of 600 million cubic feet at 30th September, 1948. Deducting 1½ years consumption based on the Northwestern Utilities consumption figures we find that 23 billion estimated reserve is now gone leaving 577 billion cubic feet. It is possible from the following estimates of consumption provided by the Northwestern Utilities Limited (which we think are conservative estimates) to demonstrate that by the end of 1954 that Company will have sold 120 billion of the remaining reserve in the field. These are the estimates in question.

1950	Estimate	19,770,000 M.C.F.
1951	Estimate	23,300,000 M.C.F.
1952	Estimate	26,500,000 M.C.F.
1953	Estimate	27,700,000 M.C.F.
1954	Estimate	28,700,000 M.C.F.

If we assume for ease in computation an average drain on the Viking-Kinsella field reserve of 30 billion cu. ft. annually as an average for the years 1955 to 1960, we are left at the end of 1960 with

277 billion cubic feet in the field. This means that with an assumed average consumption of 40 billion cubic feet per year from the field from 1961 onwards that reserve may well be exhausted before 1970 in regard to volume. We have not the peak load estimates of the Northwestern Utilities Limited for 1960 onwards but it would seem likely that the peak load requirements by that time may have to be met from some field other than Viking-Kinsella.

It seems clear that before long Edmonton will be vitally interested in reserves of gas from the Edmonton area. We note that on page 5 of Exhibit 42 filed at the hearing of the West Coast Transmission Company application Dr. Nauss estimated the reserve in the Leduc field at 576 billion cubic feet and Edmonton claims the right to have this figure used in preference to the higher reserve estimates of Mr. Slipper. We remind the Board that while the Dr. Pot estimate of the Leduc potential is quoted on page 26 of the Slipper report yet this estimate has been revised already by the Imperial Oil Company in a letter from the Company to D.P. McDonald, K.C., filed as Exhibit 78 at the hearing of the West Coast Transmission Company application.

Assuming that there is approximately 576 billion cubic feet of natural gas in the Leduc Field we ask the Board to bear in mind that

1. Proration will require that this gas be withdrawn over a period of years.

2. The gas may only be available for withdrawal during parts of the year when the Edmonton demand is low.
3. We understand that all Leduc gas must be treated for light fractions which will give a deliverable total of gas that is about fifty per cent of the figures quoted.

We suggest that the future Edmonton consumer of natural gas is in a much less assured position than would at first appear and that to give Edmonton fifty years protection for gas supply at reasonable rates will almost certainly require an additional field, perhaps Morinville field, (We have the Morinville. I understand you are calling that the Legal field.) to be earmarked for Edmonton in addition. If this is so, and we invite the Board to examine the matter most carefully, it seems to us that the gas-bearing neighborhood of Edmonton in all directions should be dedicated for consumers of the greater Edmonton area so that peak load periods 25 years from now do not find us piping in gas from hundreds of miles away.

As a further indication of the increasing gas consumption in Edmonton we refer to the Edmonton Power Plant, a municipality owned service. Of the five boilers now in service at the Plant, three will have been converted by September 15th, 1950, to gas consumption. How much gas is consumed thereafter depends upon the quantity of coal the plant finds it desirable to consume. I might say for your information and those of you who are too well

acquainted with the situation up there, there is considerable coal mining goes on in the vicinity of Edmonton and the policy of the City has been to try to absorb the slack coal produced in the area in order to help the coal mines out in that district. What the effect of gas transmission to the West to Winnipeg, the two big areas to which the coal is shipped, remains to be seen but we have a feeling that our coal production in the area is going to go down and that more and more our power plant will be burning gas. The estimate for the Edmonton Power Plant for 1951 (based on also using 100,000 tons of coal) is 3,905,000 M.C.F.

The foregoing information is provided as a background to the submission of the City of Edmonton. We believe it provides a good example of the great demand for natural gas that can develop in one geographically small section of Alberta and hence indicates the caution with which one must approach any assessment of just what part of Alberta's reserve of natural gas can be fairly said to be surplus to Alberta's requirements.

THE CITY OF EDMONTON

Per: D. B. Menzies
CITY COMMISSIONER.

OFFICE OF THE CITY COMMISSIONERS,
EDMONTON, ALBERTA.
June 9th, 1950.

(Go to page 951)

MR.MACDONALD: These are, of course, the City of Edmonton submissions. We feel in Edmonton that some of the submissions we have made, in the most legal sense of the word, they are matters for the Board to decide, and the Board will be better able to assess them than we. However, we consider these are factors in connection with the export. Subject to that qualification, sir, Commissioner Menzies is naturally available for examination by anyone present here. I do not know whether you prefer to start first, sir, or whether you would prefer to have the counsel for the Board commence, or perhaps somebody else?

MR. D. P. McDONALD: Mr. Chairman, I think I should adopt this attitude, I think the statement made by the City of Edmonton is something that the Commissioner for the City of Edmonton should place before this Board, so that the Board will have their views. I would prefer though, as far as I am personally concerned, that the City of Edmonton do, and I am asking permission now, to have them make the same presentation with respect to the Westcoast Transmission application as they have done in this application, so that the officials and the engineers of the Westcoast Transmission will be able to, and they will be glad to, deal with the presentation on that company's aspect, and also with regard to deliverability, and the details of the fields that are now presented therein. I am not suggesting, sir, that it should be read again into the record, but that it could be filed as an exhibit in that application.

MR.NOLAN: That would be true of all applications, Mr.Chairman, because it is the intention of the City of Edmonton that this material be filed on all appli-

cations, because the heading makes that clear, that it is in the matter of certain applications thereunder for export of natural gas from the Province. I am quite sure Mr. Macdonald will agree that that is what is intended.

MR.MACDONALD: Yes, I will agree, and I will make it amply clear, if it is not already clear, that it is only a matter of accident that our presentation was made in this application, and that it was made at this time. As a matter of fact, it was a matter of convenience for the City Council, but it is of no consequence whatever, and it has no significance whatever that it comes in in the course of the Northwest Company's application. It is intended to apply, sir, to each and every application which may come before you.

THE CHAIRMAN: Yes.

....

CROSS-EXAMINATION BY MR. S. B. SMITH:

Q I have a few questions I would like to ask Mr. Menzies, sir. Mr. Menzies,Edmonton is a prosperous and growing city at the present time, I am sure you will agree with that?

A We think so, yes.

Q And Edmonton is dependent for its prosperity upon the general prosperity of the Province of Alberta?

A That is correct, sir.

Q And you would agree, I am sure, that the oil development in this Province has contributed to the growth and development and the prosperity of Edmonton?

A That is correct.

Q You hope for a continuation of that trend?

A Yes, I do.

Q You are counting on it really, aren't you?

A Yes.

Q Now, I suggest to you that the development of the gas resources of this Province is also of importance to the prosperity of the City of Edmonton, subject to two main conditions that you make in your brief, namely, protection of the supply of gas for the City of Edmonton, and the protection of the City of Edmonton as to the price of the gas supplied to it.

A That is correct,yes.

Q Those are your two main points?

A Our two main points are those.

Q Yes. Now, there is a great deal of evidence here, and I think it is probably commonsense to say, that the search for oil in Alberta assists in the discovery of gas, and the search for gas will assist in the discovery of oil? I suggest to you that subject to those two factors, which I have just mentioned, or those two conditions, that it is very advantageous to the City of Edmonton to develop the gas fields of Alberta? Subject to those two factors?

A Subject to those two factors, yes.

Q And also to export gas beyond the boundaries of the Province of Alberta, subject to those two factors?

A I would be speaking personally with regard to that. That is my own opinion.

Q Yes. And again subject to those two factors, I suggest that it would be beneficial to the City of Edmonton to have a gas grid system constructed in Alberta and a gas line for the export of gas? Subject to those two conditions?

A I say specifically subject to those two conditions.

Q Definitely?

A Yes.

Q Now, Mr. Menzies, there has been a strong agitation in the City of Edmonton and in the northern part of Alberta, for a long time for the construction of the Trans-Canada Highway through the Yellowhead Route?

A That is correct.

Q The City of Edmonton, and many others interested in northern Alberta, are now pressing for the construction of a standard highway through the Yellowhead route now that the Trans-Canada highway route is to go through the Kicking Horse Pass?

A That is correct.

Q There have been statements probably made which might suggest that if a pipeline for natural gas, for the export of natural gas were constructed through the Yellowhead route that it would follow that a highway, a motor highway, would be built through that route?

A I have heard that suggestion, yes.

Q And some evidence we had here yesterday from one expert was that it did not follow at all that because a gas pipeline was to follow a certain route there would be a permanent motor highway built on that route? You would not yourself suggest that because a pipeline was going to follow a route, a highway would necessarily follow the same route?

A Well, in view of what was said by Mr. Dixon on the question of maintenance, it is apparent that there has to be ready access to the pipeline wherever it is.

Q Yes. That was gone into in a good bit of detail yesterday,

Mr. Menzies, when you were not here, I don't think?

A I was not here.

Q With one of the highly qualified experts who was called by my friend, Mr. Nolan, and he said that construction or maintenance roads only were required, and those roads that would be required for the purposes of the pipeline they would be perhaps 12 feet wide, and in places would have grades from 15 to 20%, and would be like a logging road, could be described as a logging road, for that sort of transportation, and not suitable for highway traffic. That is quite conceivable?

A Yes.

Q Well, now, Mr. Menzies, one other matter in relation to the prosperity of Alberta and the prosperity of the City of Edmonton, subject to those two general conditions that you have mentioned, if we have surplus gas available for export, and if there are available markets, subject to your tw conditions, it seems unfortunate if we do not take advantage of the export marketswhen they are available. That much follow, or that seems to follow?

A Are you asking me personally?

Q Well, you are called here as a witness, and I am asking you your views on that subject. I am saying subject to your two main conditions?

A Well, for my own personal feeling, and I am not speaking on behalf of the City, my own impression is that if we have a surplus over and above our own requirements, it would be in the interests of the Province to export.

Q That is on the assumption that there are presently existing markets? It is conceivable, I suppose, always, that we

might have a market now and two years hence, or some time in the future, that market might have been absorbed by some other source of supply?

A That is always possible.

Q Because there are other people interested possibly in supplying those markets?

A Yes.

Q By the way, those Northwest markets - you are an engineer, Mr. Menzies?

A I am.

Q And one of the Commissioners of the City of Edmonton, and retained by the Council?

A Yes.

Q You have had quite wide commercial experience in connection with the affairs of Edmonton?

A Yes, I think so.

Q And you have lived in Western Canada for a long time?

A Yes.

Q And you know Alberta and its resources well?

A Yes, I know Alberta.

Q The market for fuel in the Pacific Northwest is not supplied at all by Alberta coal, is it, so far as you know? In the Pacific Northwest, in the United States, I am talking about?

A There may be a little from the Crow's Nest Pass, but I do not think it is very large. I am not sure.

Q If any?

A I think maybe some does go into the Pacific Northwest from the Crow's Nest Pass.

Q And so far as you know, Alberta supplies no coal to the

City of Vancouver?

A I beg your pardon? Would you be good enough to repeat the question?

Q Alberta supplies no coal to the City of Vancouver?

A Yes, it does.

Q Very much, do you know?

A Considerably from the Luscar-Cadomin area.

Q That is steam coal?

A Yes, that is steam coal.

Q In competition with bunker oil there?

A In competition, yes.

Q Certainly as far as the United States' portion of the Pacific Northwest is concerned, if we acquire for Alberta that market for export gas, that is a definite gain for Canada and for Alberta, isn't it?

A That is correct.

Q Thank you, Mr. Menzies.

MR. NOLAN: I have nothing.

....

CROSS-EXAMINATION BY MR. C. E. SMITH:

Q I have an odd question, if the other counsel have not anything at the moment. Mr. Menzies, referring to Page 1 of your submission, Exhibit 37, you have a reference there. I will read a portion of it. "Unless it was proven by evidence satisfactory to the Commission that sufficient natural gas reserves are available for the requirements of the Province for at least 50 years in the future." How did you arrive at 50 years, Mr. Menzies?

A Well, that was an arbitrary figure decided upon by the Council.

Q I mean, you just sort of took it out of the air?

A That is true. It is an arbitrary figure.

Q And I observe you have just stated you are an engineer as well as a man with experience as a Commissioner. Do you think that anybody can come to any very definite conclusion on a figure 50 years in the future with respect to gas reserves ?

A Would you mind repeating that question?

Q Do you think that anyone could come to any very definite opinion with reseect to reserves if you have to figure to the extent of 50 years in the future?

A I suppose what you are implying by that is that changes take place in the interim and that if you try to predict 50 years you do not know what is going to happen in the meantime. Is that what you have in mind?

Q I am not suggesting anything. I am just suggesting that is an awfully long time to figure out anything with respect to gas reserves. In your opinion - -

A I think it is not unreasonable in view of the amount of capital that is tied up in appliances, in pipe and so on, in the City of Edmonton.

Q Let me put it this way, has the City of Edmonton any information by way of evidence that will assist this Board in trying to form an opinion with respect to the reserves over a 50 year period?

A I do not think it has, no.

Q Have you any information at all that would assist us?

A I would say no.

Q I take it that the only information that you wanted to bring to the Board's attention, with respect to reserves, is what you call the Submission - I think you call it that, or estimate - of Mr. Ralph Davies or Davis?

A Davis.

Q Plus the remarks made by Dr. Knode and somebody else with respect to the Leduc field?

A That is correct.

Q Have you anything more to assist us than the reference to those two men, or those three men probably?

A No, I have not.

Q You have nothing else to assist the Board about the general reserves ?

A No, I have not.

Q I take it you mentioned this particularly because Edmonton itself is particularly interested in those two fields?

A That is particularly the reason and that, I might say, in reply to that if you do a little bit of figuring on the potential figure that that gives you for our power house more than our next year's estimate you will see that we are almost at the figure I estimated now.

Q Have you seen the estimates that were made in the application by the Northwest Utilities?

A Yes.

Q Have you compared your estimates and those that were put in on the Westcoast application or during the Westcoast application, by Northwest Utilities, either with respect to the population gain and use?

A Yes, we have.

Q And they are practically the same?

A They are the same.

Q There is no great difference you should consider in thinking over theirs or yours?

A That is correct. There is not a great deal.

Q And when we are on the question of estimates, I think Mr. Smith has dealt with this, regarding the growth in population I take it that Edmonton city as well as other parts of Alberta, the expected growth depends to some extent on the future development of the gas and oil industry in this Province?

A It certainly does, yes.

Q I take it you are agreeing with me that if export is granted probably it will be an incentive to further and more active gas, and possibly oil, development?

A I do not think there is any doubt of that.

Q So it is right to say that the increase in population during the past two or three years in Edmonton has in part, at any event, been due to the gas and oil exploration?

A That is correct.

Q And have we any statistics upon the difficulty of getting hotel reservations?

A That will be a matter that will be bettered in the next two years.

Q I suppose the more oil and gas men who come, they will find it more difficult to get reservations. There is just one other thing I have noted. One of them has already been covered by Mr. Smith. Several times during your submission you use the expression, having regard to your evidence as to the existing potential natural gas supply,

you have reminded the Board of its duty in several respects in your submission, Mr. Menzies, and will you go so far as to suggest that they might apply that expression when thinking of reserves with respect to Edmonton, "existing and potential natural gas supply." You remember you did say that two or three times?

A Yes.

Q Once you used "present potential"?

A Yes, we tried to stress that very much to the Board.

Q You realize that "existing" and "potential" are not the same thing?

A No, that is true.

Q Are you content that the Board should apply such a phrase in their consideration of the Edmonton supply, apart from the whole of Alberta?

A Yes, I think I would.

Q I gather you would, because you have used it several times?

A Yes.

Q I think probably that is all I want to question you about. By the way, on page one of your Appendix, your language is changed a bit from the 50-year basis. You say "it is the concern of the City Council of the City of Edmonton that all measures possible shall be taken to insure that this great natural resource continues for a maximum period to be available to the citizens of the Province of Alberta." Is there any change there by way of number of years?

A No.

Q You use the word "maximum"?

A I am expressing 50 years, my council instructed me that

was the period they were interested in. 50 years is the period - -

Q You are now referring to legal counsel or engineering counsel or what?

A The members of the City Council.

Q The members of the City Council that a maximum period there means 50 years, that is referred to?

A I think they are synonymous.

Q I was wondering if they were going further than 50 years?

A It is difficult to say but as I say I think 50 is arbitrary.

Q Tell me this, did they ever discuss the question of whether or not anybody could form any definite opinion 50 years hence, or did they also take an arbitrary figure?

A I think they took an arbitrary figure.

Q You will probably agree with me that they took enough?

A That is probably true.

EXAMINATION BY DR. GOVIER.

Q I wonder if I might ask a question concerning Page 4 of the Appendix. On this page you set out the consumption of gas by three categories, Domestic, Commercial and Industrial, and from the period 1940 to 1949?

A Yes.

Q I notice that over the last 5 years the percentage of the total consumption which has gone into the industrial side has decreased slightly, starting out in 1945 at around 18% and ending up around 14%. The Board has received evidence suggesting that these figures are considerably less than for example the average percentage industrial consumption in the United States, Mr. Menzies. I wonder if you could

help us out in making any suggestions of the possible future trend of industrial consumption or the percentage of the total consumption that will be industrial consumption?

A It is a difficult thing to say because that is tied up with the development of industry and the type of industry. We have rumours, a great number of rumours as to people who are interested in coming into the city. A number of them are from the British Isles and cannot come at the present time because of the money situation. But to say specifically I know that any large industries are coming to whom gas is a very important product, I would be incorrect. I know of a great number of rumours. But specifically I do not know of any particular one at the present time. The biggest increase, as I have tried to point out, in gas consumption is going to be in our own power plant, if you are going to consider that as industrial use, and I imagine that would be indicated in the industrial category in this tabulation?

Q Yes, that is right.

A You will see it will be considerably increased in the next year. We are really only flowing gas into the boilers now. It will go on much more rapidly in the future.

Q You would not care to make any prediction as to the amount of increase of that industrial load?

A No, I do not think I would care to do that without giving it further thought. I would not want to do it offhand.

Q Thanks.

MR. C. E. SMITH: I would just like to ask one question I overlooked. Mr. Menzies, I take it you will agree with me that if the export is granted and undertaken

there is a condition - you have pointed out there will be an increase in price - but there is quite a large possibility that there might be, if not a decrease, a less increase with export than if export is not permitted. Do you agree with that?

A I am sorry, I did not get part of your statement.

Q Let us take the City of Calgary. Supposing it is admitted in the near future we have to get more gas and probably have to pay more for it. People do not supply it without money?

A That is right.

Q We might have to pay more in the City of Calgary anyway for gas in the not too far distant future, export or no export?

A That is correct.

Q Would you agree if there is export the increase in price that we in Calgary might have to pay might be less of an increase than if export was refused?

A Well, I can see that would work both ways.

Q It would be possible?

A Yes, sir.

Q One other question. Your power plant up there, I take it, as you use continuing larger amounts of gas you use a less amount of coal?

A That is correct.

Q So that if you do continue as you have been doing, in using greater amounts of gas, the coal operators are going to sell less and the miners are going to make less, likely?

A Yes, but that is not going to be our policy that will dictate that. It will be their ability to get rid of their coal.

Q I am not blaming you, but they will be selling a lot less coal if you use more gas. That is correct?

A That is correct.

(Go to page 966)

I do wish again to thank the Northwest Natural Gas Company and the Alberta Natural Gas Grid Limited for letting us come in at this time, sir.

THE CHAIRMAN: Before we adjourn today, I would like to make an announcement with regard to the date of future hearings. After consultation with all counsel concerned, the Board has agreed to fix the following adjournment dates:

On June 12th the Westcoast application will be again adjourned to November 6th.

On June 19th the date set by the Board for hearing Western Pipelines application, that Hearing will be adjourned to September 25th.

On June 20th the Board will hear in Edmonton the Westcoast Transmission application to export gas to the Town of Dawson Creek.

That, I might say, is a completely separate application to the ones we have already heard some evidence on.

The Northwest application will be adjourned today until October 23rd.

On October 9th we will hear the Prairie Pipelines application.

The Northwest application then is adjourned until October 23rd.

We will adjourn now.

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